

# ***Hanford Tank Waste***



## **Fiscal Year 2001 Accomplishments**



*CH2M HILL Hanford Group's mission is to safely store and prepare to retrieve and dispose of Hanford tank waste*

October ended a fiscal year in which CH2M HILL Hanford Group improved on safety while accomplishing several challenging projects. Working for the Department of Energy's Office of River Protection, CH2M HILL made significant progress on preparations to retrieve tank waste for treatment and solved major safety problems with Hanford's radioactive waste tanks that have posed the highest risk.

To reduce the risk to groundwater, the nearby Columbia River, and residents of the Pacific Northwest, the Department of Energy and CH2M HILL continued efforts to prevent tank leaks and movement of past leaks deeper toward groundwater and continued developing new methods for removing the remaining solid waste in Hanford's older tanks.

Upgrades to many of the tanks and associated facilities to prepare for waste retrieval and treatment are accelerating. Major projects were finished ahead of schedule and as much as 30 percent under budget in an effort to move the Department of Energy and its stakeholders closer to the goal of closing Hanford's waste tanks for good.

### **A framework for progress**

In January 2001, the Energy Department extended CH2M HILL Hanford Group's contract for five years. Under the contract to do \$2.5 billion worth of work for \$2.2 billion, CH2M HILL will be responsible for completing six to nine milestones per year in the areas of:

- Continuing to safely store Hanford's 53 million gallons of high-level radioactive waste in 177 large underground tanks
- Designing and constructing the equipment needed in the future for retrieving and delivering tank waste to a new treatment plant
- Providing for future storage or disposal of tank waste after it has been treated, and preparing for deactivation and decommissioning of facilities

The company's fiscal year 2001 budget for operating the tank farms and preparing for waste retrieval was approximately \$400 million. With over 1,300 employees, CH2M HILL Hanford Group is the largest in the family of companies that make up CH2M HILL, Limited.



*Contract extended 5 years:  
\$2.5 billion worth of work  
for \$2.2 billion*



*Wyden congressional safety watch list closed*



*Tank SY-101 back in service*



*Maintenance outages scheduled*

## Reducing the risk: Safe storage

### *Congressional watch list closed*

Office of River Protection Manager Harry Boston announced in August the resolution of significant safety issues resulting in the removal of the final 24 high-level waste tanks from the Wyden congressional safety watch list. Closure of the final safety issue completed a Tri-Party Agreement milestone more than a month early.

Oregon U.S. Senator Ron Wyden authored the law in the early 1990s requiring the Department of Energy to watchdog the most dangerous tanks at Hanford. As many as 54 tanks were originally on the list, and others were added, because of concerns over generation of flammable gases, the presence of flammable organic chemicals, the presence of potentially explosive ferrocyanide, and high-heat levels generated by certain types of wastes.

At a news conference in Richland, Senator Wyden recognized Hanford employees for their efforts.

“They were the folks who, on a day-to-day basis, took the steps to make sure that the hazards, that each of the 54 tanks originally on the Watch List, were systematically eliminated,” said Wyden. “We owe a special thanks to the Office of River Protection, because they’ve made it clear that they’re going to continue this effort of monitoring.”

“I too want to thank Harry Boston and the Office of River Protection, but also CH2M HILL, because it wouldn’t have worked without their perseverance and the workers out there getting the job done,” said Congressman Doc Hastings.

### *Tank SY-101 returned to service*

Following safety reviews by the Department of Energy and its regulators and contractors, Hanford’s once-“burping” waste tank has been returned to service, marking the end of more than a decade of serious safety problems and a costly effort to solve those problems.

Tank SY-101 will be a key staging point for single-shell tank waste as it is transferred across the Hanford site to staging tanks prior to treatment in a planned vitrification facility. Returning the million-gallon, double-shell tank to service closes the book on what was once Hanford’s and the Department of Energy’s top safety concern.

### *Maintenance outage program begun*

While safe storage of waste within the double-shell tank farms continues, those facilities are being upgraded and new systems constructed to prepare for delivering waste to the planned vitrification facility. Because of this dual role, Hanford crews vie for time and space within the often-crowded tank farms.



*Slowing the spread of contamination from past tank leaks*



*Removing liquid waste from Hanford's older tanks*



*Upgrading tank waste transfer systems*

To alleviate these schedule conflicts and increase efficiency, CH2M HILL initiated a maintenance outage program. A common practice in the nuclear energy industry, maintenance outages are periods of time dedicated to performing corrective and preventative maintenance, freeing the tank farm for construction work later.

#### *Slowing the spread of contamination*

Efforts to keep water out of older tank storage areas where past tank leaks have contaminated the soil with radioactive and hazardous waste began in fiscal year 2001. Crews are cutting unneeded water pipes, building berms around tank storage areas, and installing drainage control on nearby roads to keep water from moving toward the tanks.

Work to keep water away from the tank farms will significantly slow down movement of contamination from past leaks toward groundwater and the nearby Columbia River. Sixty-seven of Hanford's 149 older single-shell tanks have leaked or are assumed to have leaked an estimated one million gallons of waste into the ground in the past.

#### *Reducing the risk of future leaks*

To prevent further leaks from Hanford's 149 single-shell tanks, retrievable liquid waste is being pumped to newer, safer double-shell tanks.

The Office of River Protection and CH2M HILL reached a cleanup milestone in November 2000, announcing that more than a million gallons of radioactive waste that threatened the Columbia River had been removed from the aging single-shell tanks at Hanford since 1998. By the end of the fiscal year, more than 1.3 million gallons had been removed.

Pumping was completed on four tanks during the fiscal year. Of the 19 tanks remaining, pumping has started on 11 tanks, and eight tanks remain to be started.

#### *Preparations for tank waste retrieval*

CH2M HILL is making more than \$1 billion in upgrades to Hanford's tank farms to be ready to retrieve waste and send it to the planned vitrification facility by 2006. The upgrades include installing thousands of feet of waste transfer piping and numerous tank mixing and transfer pumps. Other work includes preparations to remove the remaining solid waste from Hanford's older tanks.

#### *Single-shell tank retrieval preparations*

While much of the liquid waste has been removed from Hanford's single-shell tanks, a major effort is under way to demonstrate technologies needed to remove the remaining solids and sludge waste.



*Preparing to demonstrate  
new retrieval methods*

The stage is set to demonstrate a new retrieval method in single-shell Tank U-107. Hanford crews are first pumping out a layer of liquid waste. Then they will begin to dissolve a portion of the underlying solid waste, or saltcake, by alternating gentle sprays of water with pumping. Over a three-month period, approximately 37,000 gallons of waste will be removed from the tank.

The demonstration will provide important information on the best and safest way to remove solid waste from other single-shell tanks. A regulatory milestone calls for the DOE Office of River Protection to remove enough waste with dilution water to fill at least 2 million gallons of double-shell tank space before October 2006.

#### *Hanford Cold Test Facility*

In August, CH2M HILL Hanford Group awarded a \$2.4 million contract to Los Alamos Technical Associates to design and build a test facility that will include a large simulated waste tank. The facility is needed to ensure new technologies and cleanup systems work well before they're put in the highly radioactive and hazardous environment of a Hanford tank. The facility will cover nearly 10 acres near the HAMMER training facility and is expected to be ready for equipment development and testing in the summer of 2002.

#### *Upgrading and new construction*

Upgrades and new construction are under way to prepare to retrieve waste from the tanks and deliver it to the planned vitrification facility.

A 50-foot transfer pump was replaced in a double-shell tank in December 2000. The operation was called one of the most challenging jobs on a Hanford tank in a decade because of its complexity and the levels of contamination involved. Success on the project demonstrated that existing tanks could be upgraded to feed waste to a treatment facility. In January 2001, more than 800,000 gallons of waste was pumped out of the tank for processing in a nearby evaporator, freeing up valuable storage space in the Hanford waste tank system.

Other upgrade work in fiscal year 2001 included the installation of 1,300 feet of double-contained waste transfer piping, and upgrades to four waste transfer pits, which contain valves, pumps, and other equipment used to transfer radioactive waste in and out of Hanford's tanks. Polyurea, a substance similar to a spray-on truck bed liner, is being applied in these pits to make upgrades safer, easier, and less costly. Concrete was poured to build a new transfer pit.



*Installing new waste  
transfer piping*



*Replacing a 50-foot tank  
waste transfer pump*



*Finding the safest way to retrieve tank waste*



*Vitrification plant infrastructure ready*



*Interim storage for high-level waste glass logs*

## Preparations for tank waste treatment

### *Vitrification plant infrastructure ready*

The Office of River Protection announced in September that CH2M HILL completed construction of the infrastructure—electricity, water, and roads—for Hanford's future tank waste vitrification plant early and under budget.

The infrastructure project was estimated to cost \$31 million and was originally scheduled to be complete in July 2002. CH2M HILL finished the project in August 2001 at a budget of just under \$22 million — a savings of approximately \$9 million.

The project included a 62.5 million volt amp electrical substation and transmission lines to provide the vitrification plant melters — which will operate continuously at 2100 °F — with electricity to convert waste to glass logs.

Approximately three miles of pipeline to deliver water for vitrification processes, drinking, and fire fighting were installed, as well as a separate piping system nearly two-and-a-half miles long to transport liquid effluent by-products to existing treatment and disposal facilities on the Hanford Site.

Roads to the facility were widened and reinforced to accommodate heavy construction traffic, and streetlights were added. A new road also encircles the 65-acre area where Bechtel National, Inc. will build the vitrification facility.

## Preparations for disposal of treated waste

CH2M HILL Hanford Group will also be responsible for storage of the highly radioactive, but more easily managed glass logs until permanent disposal facilities are available. High-level waste glass, containing more than 99 percent of the radioactivity, will be stored in the Hanford Site's Canister Storage Building until a permanent repository is established.

CH2M HILL and the Department of Energy are preparing to apply for a Resource Conservation and Recovery Act Part B permit to retrofit two existing vaults in the building to provide a storage capacity for 880 canisters of high-level waste. Preparations will include adding storage tubes, ventilation systems, and adding or modifying handling equipment and a receiving area.

Low-activity waste glass will be disposed of in subsurface trenches in Hanford's central plateau, known as the 200 East Area. Initial design efforts have provided a concept of the trenches and an estimate of the cost and schedule involved.

Initial plans call for building one double-lined trench for the first phase of cleanup, with supporting infrastructure for a total of six trenches. Each trench would be almost the length of three football fields, nearly 90 yards wide, and 33 feet deep. Leak detection and runoff collection systems would be contained in the double liner. Each trench would have the capacity to hold 13,500 containers of low-activity waste glass.



*Working safely and looking  
out for each other*

## Hazardous work

The work of managing, characterizing, stabilizing and retrieving highly radioactive tank waste involves the four most hazardous occupations at Hanford—nuclear chemical operators, pipefitters, radiological control technicians, and electricians. Yet, by working safely and looking out for each other, CH2M HILL was able to reduce its recordable injury and illness rate by 20 percent during fiscal year 2001.

CH2M HILL reduced its lost and restricted workday case rate from 0.46 to 0.34 and the safety cost index rate by 44 percent, from \$18.88 per 100 hours worked to \$8.45 per 100 hours worked.

While the company's fiscal year 2001 numbers compare favorably with Department of Energy contractors across the nation, CH2M HILL managers and employees are not being complacent, and continuous improvement is expected.

In general, our numbers of reportable and recordable safety incidents are low," said CH2M HILL Hanford Group president and general manager Fran DeLozier. "But even one incident is one too many. If you are not continually improving, you're going backward."